(12) UK Patent Application (19) GB (11) 2 180 111 (13) A

(43) Application published 18 Mar 1987

(21) Application No 8613995

(22) Date of filing 9 Jun 1986

(30) Priority data

(31) 60/196487 (32) 3 Sep 1985 (33) JP

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(51) INT CL[4]
H04H 9/00

(52) Domestic classification (Edition I)
H3Q AR
U1S 2106 2206 H3Q

(56) Documents cited
None

(58) Field of search
H3Q
H4F
G4H
Selected US specifications from IPC sub-class H04H
H04N

(54) System for detecting recording data of video tape recorder

(57) The system is enabled to detect data concerning the time and channel a program played back was recorded at and through, by adding both calendar data such as the date and time and channel data indicating a channel to be recorded in the recording operation of the video tape recorder and by extracting the above-specified data in the playback operation. A VHF/UHF tuner 2 of a meter 100 has its tuning controlled by a tuner scanning control circuit 11 to the same channel as that tuned by the associated video tape recorder (VTR, Figure 1). The calendar and channel data from a data multiplex generator 12 are added to the video signal by 5. When applying an input from another video tape recorder or a television camera to inputs T6, T7, T8 the channel data is replaced by a signal indicating that particular one. Analog switches 4 and 8 select the particular input.

Fig. 2

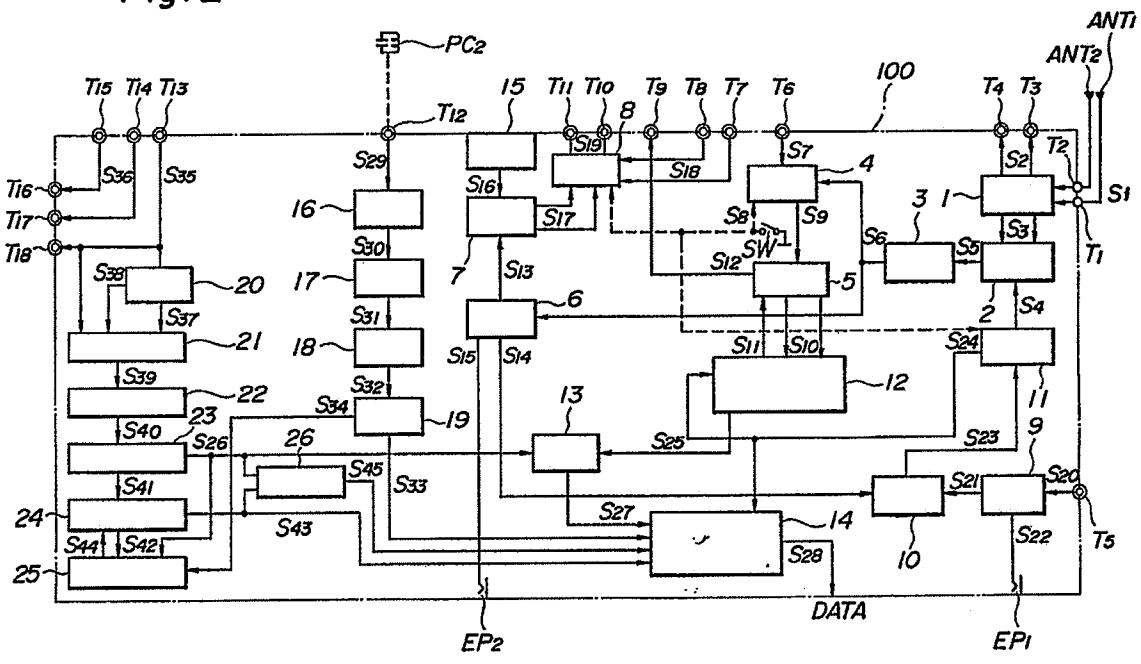

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Fig. 1

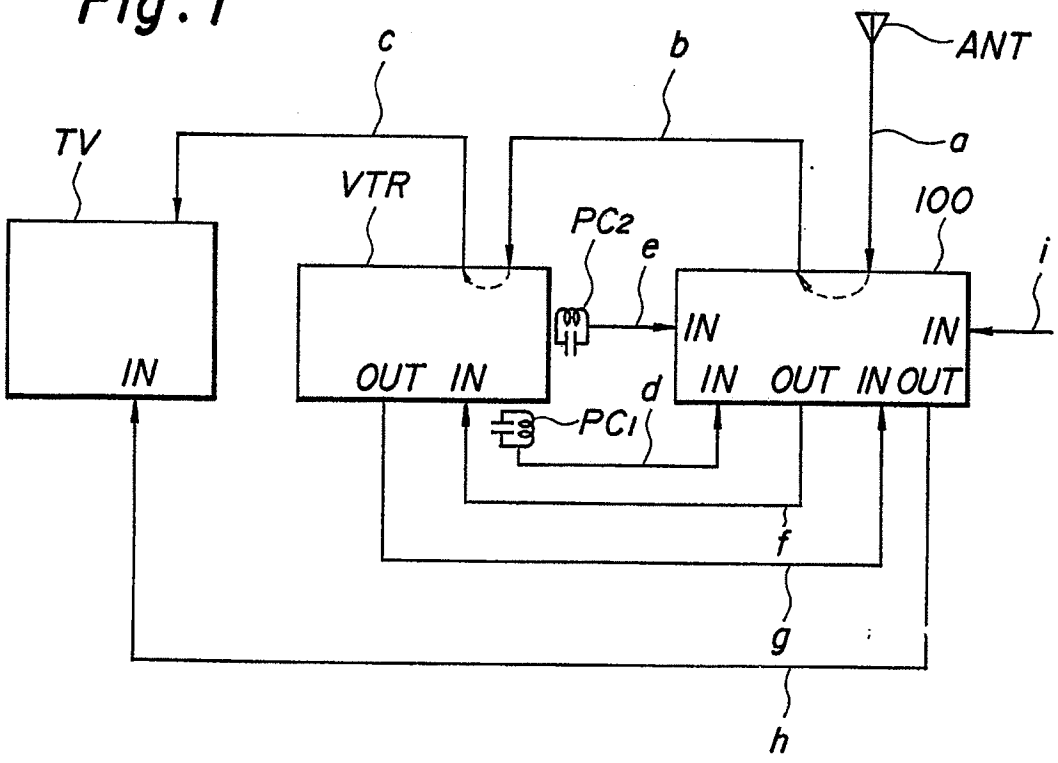


Fig. 4

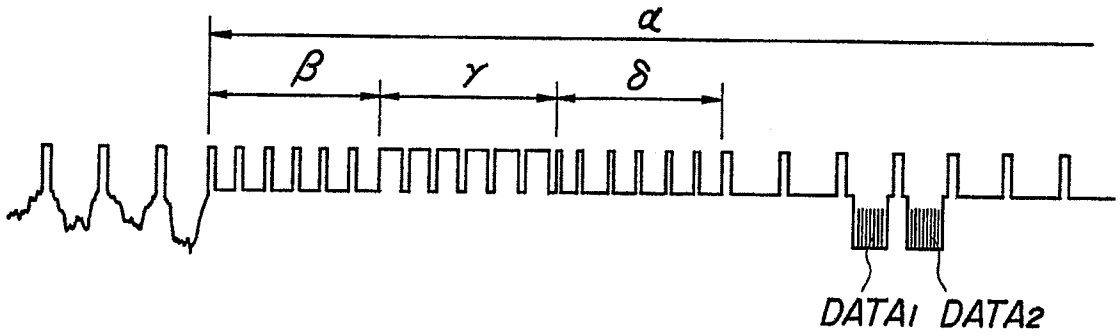
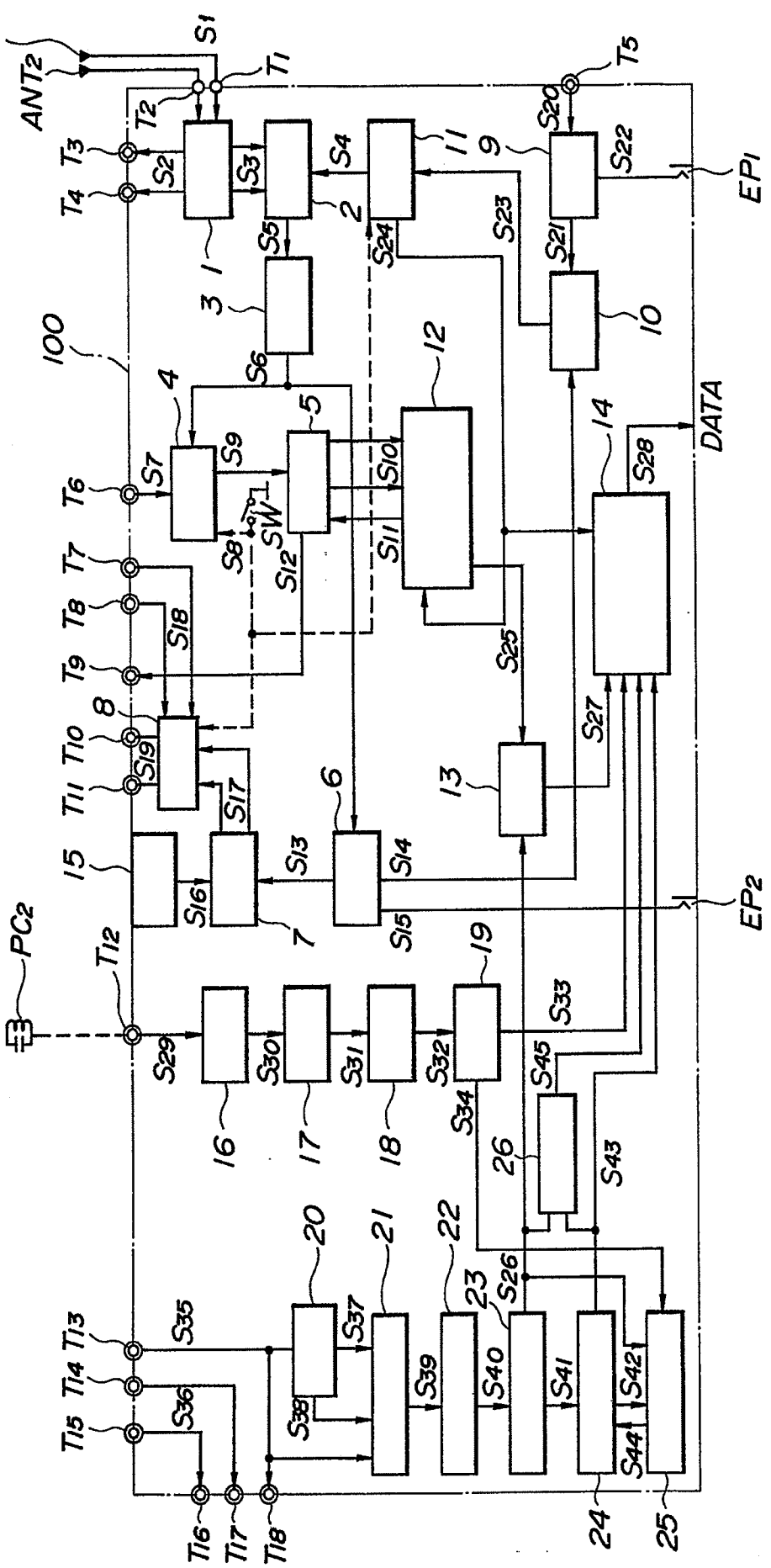


Fig. 5

DATA1	STX	10^1 YEAR	10^0 YEAR	10^1 MONTH	10^0 MONTH	10^1 DAY	10^0 DAY	10^1 HOUR	10^0 HOUR	10^1 MINUTE	ETB	BCC

DATA2	STX	10^0 MINUTE	10^1 SECOND	10^0 SECOND	BLANK	BLANK	BLANK	BLANK	CHANNEL	CHANNEL	ETX	BCC


ANT1
ANT2
S1
T1
T2
T3
T4
T5
S2
S3
S4
S5
S6
S7
S8
S9
S10
S11
S12
S13
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S45
SW1
T6
T7
T8
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T10
T11
T12
T13
T14
T15
T16
T17
T18
PC2
EP1
EP2
DATA
100
1
2
3
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5
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7
8
9
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16
17
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25
26

Fig. 2

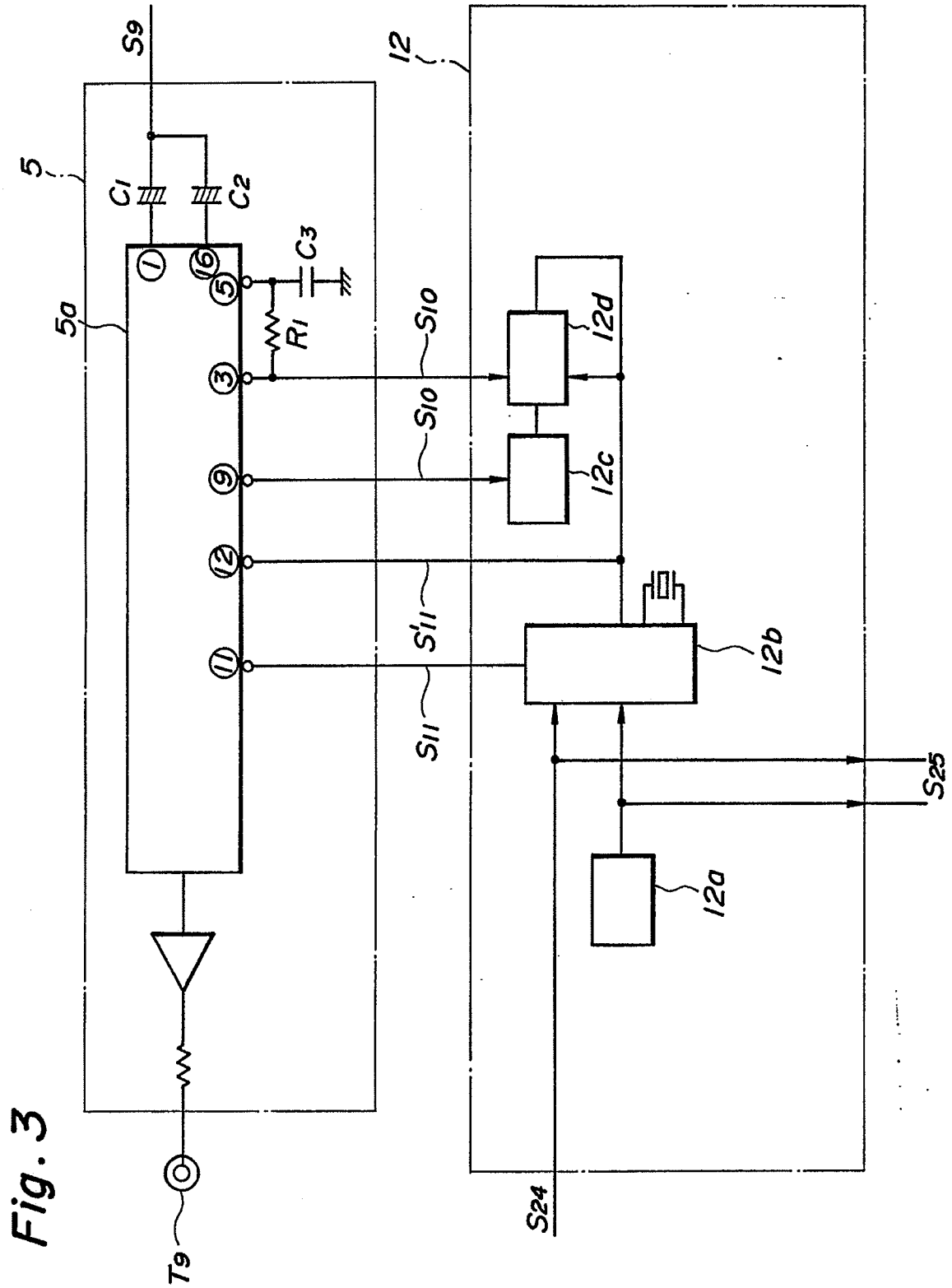
S9
5
C1
C2
C3
R1
5a
1
16
5
3
9
12
11
T9
12
S10
S10
S'11
S11
12d
12c
12b
12a
S25
S24

Fig. 3

SPECIFICATION

System for detecting recording data of video tape recorder

The present invention relates to a program rating (audience rating) measuring system and, more particularly, to a system for detecting the recording data of a video tape recorder, which system is adapted to detect data concerning the time and channel when and where a program being played back by the video tape recorder was recorded.

In recent years, the video tape recorder has spread widely into average families, and the importance of sampling data on the use of the video tape recorder has been increasing for accurately surveying the TV program ratings.

Thus, in Japanese Patent Applications Nos. 58-71221 (1983/71221), 58-107896 (1983/107896), 58-107897 (1983/107897 and 59-143052 (1984/143052), we have already proposed methods and apparatus for detecting the operating states of the video tape recorder so that the audience situations may be grasped in case the video tape recorder is used in combination with a television set.

However, what can be surveyed by that prior art has been limited to data concerning how the video tape recorder is used at each time, i.e., the data indicating the states of stop, playback recording and monitoring (that a program selected by the tuner of the video tape recorder is being observed through a TV set) as well as the channel data indicating what channel is being recorded. And, the prior art has failed to detect what program is being played back for the actual observation, i.e., the time and channel when and where the program being enjoyed was recorded. Therefore, the prior art cannot provide a sufficient variety of data and has such a defect as cannot make a sufficient research concerning the program ratings of families using TV sets and video tape recorders together.

The present invention has been conceived in view of the background thus far described and has an object to provide a system for detecting the recording data of a video tape recorder, which can detect not only the operating states of the video tape recorder but also what time and through what channel a program being played back was recorded.

Brief description of the drawings

Figure 1 is a block diagram showing the connections among a meter, to which the present invention is applied, a television set and a video tape recorder;

Figure 2 is a block diagram showing the internal structure of the meter of Figure 1;

Figure 3 is a circuit diagram showing details of a data multiplex generator and a video signal adder of Figure 2;

Figure 4 is a diagram showing the positions of a video signal, into which data are to be inserted; and

Figure 5 is a diagram showing one example of the structure of the data.

Figure 1 shows connecting relationships among a meter 100, to which a system for detecting recording data of a video tape recorder according to the present invention is applied, a television set TV and a video tape recorder VTR. Here, a device for surveying program ratings is to be attached to a TV set in a general family, and it is therefore devised in various manners in the present invention not to modify the inside of TV set as far as possible. For example, except that pickup coils PC_1 and PC_2 are disposed in the video tape recorder VTR, the individual units can be connected through connecting cables. Moreover, the pickup coils PC_1 and PC_2 need not be soldered but may merely be disposed in the vicinity of the circuit.

The structure will be described with reference to Figure 1. An antenna ANT is connected directly with the meter 100, which boosts a space wave *a* and feeds it to an internal tuner and a branched space wave *b* to the antenna terminal of the video tape recorder VTR, and antenna output terminal of the video tape recorder VTR is connected to the antenna terminal of the television set TV. Incidentally, a signal *c* to be output from the antenna output terminal of the video tape recorder VTR contains not only the space wave but also a signal which is modulated to an unused channel such as the 2nd channel.

In the set of the video tape recorder VTR, on the other hand, there are disposed both the pickup coil PC_1 for detecting a sound intermediate-frequency signal (SIF) and the pickup coil PC_2 for detecting an erase signal generated in the recording operation, and detected signals *d* and *e* are introduced into the meter 100 so that the sound intermediate-frequency signal *d* detected by the pickup coil PC_1 may be used for judging the channel received by the tuner in the video tape recorder VTR whereas the erase signal *e* detected by the pickup coil PC_2 may be used for judging that the video tape recorder VTR is in a recording state. Incidentally, the judgement of the recording state can be also conducted by another method such as by detecting an FM brightness signal (i.e., a video signal having been subjected to FM modulation so that it may be written in a video tape), which is generated from the recording circuit of the video tape recorder VTR, and the method can be replaced by suitable means.

Next, a video/audio signal *f* output from the meter 100 is applied to an external input terminal of the video tape recorder VTR (namely, the signal *f* can be switched by means of a slide switch of the set of a common video tape recorder in case the recorder uses the external input terminal), and a video/audio signal *g* output from the video tape recorder VTR is input to the meter 100. This constitutes the most featuring point of the present invention. According to the present invention, more specifically, the recording operation is conducted by using not the signal received by the internal tuner of the video recorder VTR but the signal received by the internal tuner of the meter 100 as the signal to be recorded, by demodulating the signal received by the internal tuner of the meter 100 into a video signal and an audio signal, by adding to the video signal both calendar data indicating the date, the time and so on and channel data indicating what channel the program is recorded through, and by applying the signals to the external input terminal of the video tape recorder VTR. Gener-

ally speaking, it is considerably difficult to mix the data into the signals of the internal tuner of the video tape recorder VTR without modifying the hardware of the video tape recorder VTR. That mixing operation, however, makes it possible to insert the data with ease. Incidentally, since the internal tuner of the meter 100 is always tuned to the same channel as that of the internal tuner of the video tape recorder VTR on the basis of the sound intermediate-frequency signal *d* detected by the pickup coil PC_1, the operation can be performed like the normal recording operation without any consciousness of the presence of the meter 100 by means of a channel selecting button or the like lying on the panel of the video tape recorder VTR.

On the other hand, at playback, the video/audio signal *g* output from the video tape reocrder VTR is used to take out the calendar data and channel data written in the video tape and to detect what time and through what channel the program was recorded, and the extraction and decoding of the data are conducted in the meter 100. Incidentally, since that signal *g* has already been demodulated into the video signal and the audio signal, it is returned as a signal *h* from the meter 100 to the television set TV and is applied to an AV terminal of the television set TV so that the playback image may be observed. Despite this, however, the path of the signal *h* is not necessary in case the observation is conducted with the signal which was modulated to the unused channel through the antenna terminal from the video tape recorder VTR.

On the other hand, a signal *i* to be input to the meter 100 indicates what coming from another video tape recorder or a television camera and is usually used less frequently. Since the video/audio signal input terminal (i.e. the external input terminal) of the video tape recorder VTR is occupied for feeding the recording signal from the meter 100, more specifically, there is no terminal to be inserted in case a dubbing is to be undergone or a television camera is to be used. In this case, however, the connection is made not with the video/audio signal input terminal of the video tape recorder VTR but with a terminal disposed in the meter 100. Incidentally, in case the dubbing is to be conducted by another video tape recorder or in case the recording operation is conducted by a television camera, the aforementioned channel data are replaced by a signal indicating that particular case.

Next, Figure 2 shows details of the internal structure of the meter 100 of Figure 1. Here, as shown in the figure, the antenna is divided into independent VHF and UHF antennas, and the demodulated audio signal is divided into two right and left signals so that it may satisfy the stereophonic or bilingual broadcasting purposes. Incidentally: reference characters T_1 and T_2 indicate the antenna input terminals of the meter 100; characters T_3 and T_4 terminals connected with the antenna input terminal of the video tape recorder VTR; characters T_5 a terminal to be connected with the pickup coil PC_1; characters T_6, T_7 and T_8 terminals to be connected with another video tape recorder or a television camera; characters T_9, T_{10} and T_{11} terminals to be connected with the external input terminal of the video tape recorder VTR; character T_{12} a terminal to be connected with the pickup coil PC_2; characters T_{13}, T_{14} and T_{15} terminals to be connected with the video/audio output terminal of the video tape recorder VTR; and characters T_{16}, T_{17} and T_{18} terminals to be connected with the AV terminal of the television set TV.

In Figure 2, antennas ANT_1 and ANT_2 are connected through the terminals T_1 and T_2 with the input terminals of a VHF/UHF booster 1, which has its one output S_2 connected through the terminals T_3 and T_4 with the antenna terminal of the video tape recorder VTR and its other output S_3 connected with the antenna terminal of a VHF/UHF tuner 2 inside of the meter. Moreover, this VHF/UHF tuner 2 has its tuning controlled, as will be described hereinafter, by a tuner scanning control circuit 11 to the same channel as that of the internal tuner of the video tape recorder VTR.

Next, an output S_5 of the VHF/UHF tuner 2 is connected with the input terminal of a VIF (i.e., video intermediate-frequency) detecting AGC (i.e., automatic gain control) circuit 3, and a video signal S_6 detected by that VIF detecting AGC circuit 3 is connected with both the input terminals of an analog switch 4 and an SIF (i.e. sound intermediate-frequency) amplifying and audio demodulating circuit 6. Here, the analog switch 4 is paired with another analog switch 8 lying in the path of the audio signal and is used to switch the video signal and audio signal to be fed to a succeeding circuit in the dubbing operation or when the television camera is used, to the signals input from the terminals T_6, T_7 and T_8. The analog switch 4 and 8, switches the signal paths when the plug is connected with the terminals T_6, T_7 and T_8 by a switch SW for detecting dubbing or the like attached to one of the terminals T_6, T_7 and T_8.

Next, the output S_9 of the analog switch 4 is added in a video signal adder 5 to the calendar data and the channel data given by a data multiplex generator 12 so that the output S_{12} of the video signal adder 5 is connected through the terminal T_9 to the external input terminal of the video tape recorder VTR. On the other hand, the output S_{13} of the SIF amplifying and audio demodulating circuit 6 is demodulated through an audio multiplexing and demodulating circuit 7 to the two right and left audio signals S_{17} and is connected together with the video signal S_{12} of the aforementioned video signal adder 5 through the analog switch 8 and the terminals T_{10}, T_{11} and T_9 with the external input terminals of the video tape recorder VTR. Incidentally, a demodulated audio signal S_{15} can be taken out from the SIF amplifying and audio demodulating circuit 6 through an earphone terminal EP_2 so that the operating state of the circuit can be tested. Moreover, a block 15 indicates an audio control panel for switching or selecting the right and left stereophonic signals or selecting bilingual signals in the case of audio multiplex broadcasting.

Figure 3 shows details of the video signal adder 5 and the data multiplex generator 12 of Figure 2. The video signal adder 5 is constructed of a video signal adding integrated circuit 5a (e.g. "NJM2207") and has a function to add the signals S_{11} and S_{11}', which are applied to a letter offset check terminal 11 and a

letter control terminal 12, as the PCM signals to the video signal S_9 which has been applied to terminals 1 and 16 through capacitors C_1 and C_2. Incidentally, terminals 3, 5 and 9 are used for extracting synchronous signals from the video signal. On the other hand, the data multiplex generator 12 is constructed of: a calendar data generator 12a for generating the calendar data composed of the date and the time; a shift register 12b for serially transforming a channel data signal S_{24} given by the tuner control scanning circuit 11 and calendar data signals fed from the calendar data generator 12a to send out the transformed signals to the video signal adding integrated circuit 5a; and a flip-flop 12c and a register 12d for determining the position, in which the PCM data are to be inserted, from the synchronous signal obtained from the video signal adding integrated circuit 5a.

Figure 4 shows a portion of the video signal after the data have been added thereto. PCM data $DATA_1$ and $DATA_2$ are inserted in the sequence of several pulses after an equivalent period β, a vertical synchronizing period γ and an equivalent period δ for a vertical blanking period α. On the other hand, Figure 5 shows an example of the data type, in which the calendar data and the channel data are suitably arrayed. Incidentally, it is quite natural that the position for insertion of the data and the type of the data be not especially limited.

Reverting to Figure 2, the remaining construction will be described in the following. A signal S_{20} of the pickup coil PC_1, which is to be applied to the terminal T_5, is fed through an SIF amplifying and audio demodulating circuit 9 to one input terminal of an SIF/CH comparator (i.e., sound intermediate-frequency and channel comparing circuit) 10, in which it is compared with an sound intermediate-frequency signal S_{14} fed from the aforementioned SIF amplifying and audio demodulating circuit 6 so that the identity of the broadcast programs received by the inside tuner of the video tape recorder VTR and the VHF/UHF tuner 2. Moreover, a demodulated audio signal S_{22} can be taken out from the SIF amplifying and audio demodulating circuit 9 through an earphone terminal EP_1 so that the operating state of the circuit can be tested. Incidentally, since the sound intermediate-frequency signal belongs to an FM signal having a constant amplitude, it has been confirmed that the comparison can be facilitated to ensure a sufficiently precise judgement. Still moreover, the identity of the received channels can be judged by another juding means such as the means using the video intermediate-frequency signal or the means using the demodulated audio signal, and these means can be suitably altered.

Next, the SIF/CH comparator 10 outputs a signal S_{23} indicating the consistency or inconsistency from the compared result of the two signals to the tuner scanning control circuit 11 so that the station selecting voltage of the VHF/UHF tuner 2 is periodically varied until the two signals becomes coincident. By this operation, however, the received channel of the VHF/UHF tuner 2 is caused to follow that of the internal tuner of the video tape recorder VTR so that the two tuners receive an identical channel in the steady state of the operation. Moreover, the channel data signal S_{24} according to the station selecting state is output from the tuner scanning control circuit 11 and is fed to the aforementioned data multiplex generator 12. Incidentally, the tuner scanning control circuit 11 is fed with the signal of the aforementioned switch SW for detecting dubbing or the like, and the data indicating the recording by the dubbing are output in place of the channel data indicating the channel of the tuner in case the dubbing is conducted from another video tape recorder or in case a television camera is used.

On the other hand, the erase signal of the video tape recorder VTR, which has been detected by the pickup coil PC_2, is fed from the terminal T_{12} through an erase signal amplifier 16, a rectifier 17, a voltage comparator 18 and a recording state detector 19 so that a signal S_{33} indicating the recording state is produced.

On the other hand, the terminals T_{13}, T_{14} and T_{15} are fed with the signals from the video/audio output terminals of the video tape recorder VTR to output naturally the video and audio signals being recorded in the recording operation and the video and audio signals being played back in the playback operation. Thus, only the PCM signal is extracted from a video signal S_{35}, which is obtained from the terminal T_{13}, by a vertical blanking PCM signal extractor 21 at a timing obtained from a synchronizing and separating circuit 20 and is decoded to the original date by a PCM decoder 22. The output S_{40} of the PCM decoder 22 is once stored in a buffer memory 23, the output S_{26} of which is compared in a data comparator 25 with the output S_{42} of the data memory 24 so that the content of the buffer memory 23 is written in a data memory 24 when the two outputs take different values. Since the PCM data appear with the same period as that of the vertical synchronizing signal, more specifically, sixty groups of data arrive for one second, and it is meaningless to write them in the data memory 24 upon each arrival. Therefore, the change in the data is detected by the data comparator 25, whereupon the introduction of the data is conducted by feeding a signal S_{44} to the data memory 24.

Moreover, the output S_{26} of the buffer memory 23 is always compared in a data comparator 13 with the data S_{25} of the data multiplex generator 12, and a signal S_{27} indicating the playback state is output, assuming that the playback is being conducted in the case of inconsistency. In case the video tape recorder VTR is in a recording or standby state, more specifically, signals mixed with the data must be attained simultaneously at the terminals T_{13}, T_{14} and T_{15} from the meter 100. It is therefore possible to judge that the playback is being conducted in the inconsistency case. Incidentally, in case no data exist in the signals which are obtained from the video tape recorder VTR through the terminals T_{13}, T_{14} and T_{15}, it is possible to judge that the tape has been recorded by another video tape recorder or that the software has been commercially purchased.

At the output S_{26} of the buffer memory 23 and the output S_{43} of the data memory 24, on the other hand, there is disposed a fast forward/rewind/pause detector 26 by which whether the operation belongs to the normal playback or another such as the fast forward-

ing, rewinding or pause is judged from the changing data of the sequentially changing data. By incorporating even the seconds into the calendar data, more specifically, the operation is judged to be: the normal playback in case the arriving data increase roughly every one second while containing more or less errors; the fast forwarding in case the change of the data per second is faster; the rewinding in case the data per second decrease; and the pause in case the data per second remain unchanged.

On the other hand, the channel data S_{24} having been judged by the tuner scanning control circuit 11, the signal S_{27} having been detected by the data comparator 13 and indicating the playback state, the signal S_{33} having been detected by the recording state detector 19 and indicating the recording state; a signal S_{45} having been detected by the fast forward/rewind/pause detector 26 and indicating the fast forwarding, rewinding or pause, and the recording data S_{43} having been output from the data memory 24 are input altogether to a transmitter 14 and are subjected to a suitable data processing so that the processed data are sent out to a data transmitting unit not shown in the drawing. In actual program rating surveys, incidentally, not only those data but also the channel data of the television set TV, on/off data, and data on the survey time and so on are required, but data of the existing system can be applied in place.

As has been described hereinbefore, according to the present invention, the data concerning the time and the channel a program being played back was recorded at and through can be attained although it is impossible in the prior art. As a result, there can be attained an effect that it is possible to make program rating surveys more precisely in families where the television sets and the video tape recorders are used in combination.

CLAIMS

1. A system for detecting the recording data of a video tape recorder, characterized: by adding calendar data and channel data to either a video signal of a tuner made receptive of the same channel as that received by said video tape recorder or a video signal input from the outside; by applying the resultant video signal to an external input terminal of said video tape recorder; and by extracting said calendar data and said channel data from the signal played back by said video tape recorder.

2. A system according to Claim 1, characterized by judging a fast forwarding, rewinding or pause from the changing state of said calendar data extracted.

3. A system for detecting the recording data of a program played back on a video tape recorder substantially as herein described with reference to the accompanying drawings.

Printed for Her Majesty's Stationery Office by
Croydon Printing Company (UK) Ltd, 1/87, D8817356.
Published by The Patent Office, 25 Southampton Buildings, London WC2A 1AY,
from which copies may be obtained.